DETECTION REPORT FROM AERIAL SURVEY ON NATIONAL FORESTS IN LAKE STATES, 1967

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INTRODUCTION

The 1967 aerial survey over the National Forests located in the lake States detected several major forest insect outbreaks. Jack pine budworm defoliation was found on 6 National Forests and in all 3 states. Forest tent caterpillar defoliation was observed along the Canadian Border in Minnesota. The spruce budworm defoliation appears to be increasing in the Superior National Forest.

Extensive oak defoliation by the fruit-tree leafroller occurred on the Huron-Manistee National Forest. Several other minor pest problems are reported.

OBJECTIVES

The primary objective was to determine the location and the extent of jack pine budworm defoliation. However, at the same time any other major abnormalities observable from the air were to be recorded.

METHODS

The aerial survey was conducted in a Forest Service twin-engine Aerocommander. Only the Superior National Forest was flown in a single engine aircraft - Pontoon equipped Cessna 180 and a Dettaviland Beaver. The aerial flights were made in latter part of July and early August. Ground checks were completed by mid-September.

The survey crew consisted of a navigator and two observers one on each side of the aircraft. The entomologist, experienced in aerial survey, was the crew chief. The two assistants were on the survey for the first time. About an hour's flight training was made before the survey. The more advanced training, such as identification of abnormal conditions were made as the conditions occurred. The first 10 hours of detection was closely supervised by the crew chief. "Sketch mapping" technique was used to record abnormal forest conditions. The aircraft was flown at 1000 ft. above the ground and at 150-170 m.p.h. airspeed. The planned flight-lines were about 6 miles apart, however adjustments were made as needed. Small outbreaks were circled for more accurate mapping and potential identification of the problem. Generally, this type of survey

provided complete coverage of the area, unless poor visibility reduced vision. Jack pine budworm defoliation was the easiest to detect and outbreak areas were seen ocassionally, more than 10 miles away.

Ground checking was directed primarily to the major outbreak areas as determined from aerial survey results. All ground observations were made by an entomologist. The extensive survey area and the abundance of problem areas did not permit ground examinations of lesser problem areas.

Aerial surveys and ground observations, generally, were done in the company of representatives from the National Forests. This enhanced early evaluation of the problems to determine needs for further more intense biological evaluation.

The aerial detection survey covered about 12 million acres of Federal, State, and private lands at a cost of approximately $0.50 per 1000 acres. Special arranagements were made with Minnesota Department of Agriculture, when flight boundaries were streamlined to facilitate more economic survey. The State surveyed the Red Lake and Nettle Lake Indian Reservations, and the Virginia Ranger District, Superior National Forest. In turn, we surveyed State and private lands north of Brainard and south of Chippewa National Forest, and the eastern part of Arrowhead Country.

SURVEY RESULTS

Jack-pine budworm, Choristoneura pinus Free.

Jack-pine budworm defoliation on jack and red pines was observed in all National Forests, except the Nicolet and Superior. The gross area defoliated, that is the area in which jack pine occurs as a component of the overall type, defoliated is about 400,000 acres. Of this, probably only about 100,000 acres is jack pine. About half of the area is moderately to severely defoliated, i.e. browning very obvious from air. The remaining infested area is classed as lightly defoliated, i.e. defoliation barely visible from air, or detected only from ground checks. The more severe defoliation was observed in the northern parts of Michigan, Minnesota and Wisconsin. Considerable red pine defoliation was observed on the Soo Ranger District, Hiawatha National Forest, and the Avenue of Pines area, Chippewa National Forest.

More detailed evaluation of the jack-pine budworm outbreak on the National Forests is presented in the Biological Evaluation of the Jack-pine Budworm by Millers and Erickson (1967).

Forest tent caterpillar, Malacosoma disstria Hub.

The major outbreak of the forest tent caterpillar is located in northern Minnesota, along the Canadian Border. Defoliation isreported by G. Beach, Minnnesota Department of Agriculture, in approximately 20 mile wide belt from International Falls east to the Cook County line. Our aerial flights confirmed his observations on the Superior National Forest, where about 300,000 acres of gross area received moderate to heavy defoliation, i.e. defoliation easily visible from air two months after insect feeding. Most of the aspen in this area are not marketable because of poor access, distance to the mills and location within the no-cut zone of the Boundary Waters Canoe Area.

Spruce budworm, Choristoneura fumiferana (Clem.)

Spruce budworm defoliation was observed only on the Superior National forest. The aerial survey was too late to detect light to moderate defoliation, but severe defoliation was visible. The typical defoliation is complete removal of current balsam fir foliage, but little feeding on the previous years needles. Some feeding occurred also on the white spruce mixed with the balsam fir.

The outbreak area is broken into three local infestations (Map). The gross area is more than 100,000 acres, but only a quarter of this is balsam type. No further evaluation is anticipated, because of poor market situation for balsam fir.

Larch sawfly, Pristiphora ericksonii

Tamarack defoliation was observed throughouth the Lake States aerial survey. The more severe defoliation of large areas was seen in northcentral Minnesota and northern Wisconsin. This appears to be an increase from the previous year, however, lack of survey information makes comparisons difficult. Lack of tamarack markets in the Lake States makes further evaluation useless economically.

FRUIT TREE LEAFROLLER

Extensive oak defoliation was observed on the Huron-Manistee National Forests. Over 160,000 acres of gross area is moderately to severely defoliated on the Huron National Forest and about 250,000 acres of gross area on the Manistee National Forest. In these areas defoliation was visible from the air, and ground checks indicated more than 50% of foliage damaged. Further evaluation is not anticipated unless requested by the Forest.

BALSAM FIR SAWFLY

Balsam fir defoliation was observed in the sourthern tip of Stonington Peninsula, Hiawatha National Forest. Only few hundred acres are believed to be infested, however, ground-checking was not made because of other commitments. The identification was made from speciments submitted by the Forest. Further evaluation should be requested by the Forest, if deemed necessary.

WHITE PINE BLISTER RUST

Red "flagged" white pine was common on the Superior National Forest. Small sawlog and larger sized trees appeared severely attacked. Few ground observations indicated that the flags were caused by white pine blister rust.

BIRCH DIE-BACK

Dead and dying birches were common in the Arrowhead country, Minnesota. The situation is most common in Cook County and east, including Isle Royale. The predominant symptoms seen from the air were the thinning of birch crowns. Ground examinations indicated lack of upper crown foliage. The causes were not determined. Further evaluations should be requested when so desired.

PINE SPITTLEBUG (?)

Browning, or "off color", jack pine plantations were observed in southern part of Hiawatha National Forest. East side, and SE corner of Lakewood Ranger District, Nicolet National Forest. Ground observations indicated abundance of browning needles without any apparent damage to them. Browning appeared predominantly on the previous year's growth. Few feeding scars at the nodes of twigs suggest that the pine spittlebug may be the culprit. However, this type of damage on jack pine has not been reported, and the spittlebug did not appear so abundant in 1965 to cause this extensive damage.

The Hiawatha National Forest had detected and reported the unusual conditions in the spring of 1967, and indicated their concern. Perhaps, the Forests should request further evaluation to confirm the causative organism and to determine the trend of the problem.

HARDWOOD MORTALITY - OTTAWA NATIONAL FOREST

Hardwood mortality had been reported SW of Lake Gogebic, Michigan, in 1966, and consequently reflown in 1967. The extent of the tree mortality area has not increased. The mortality occurred primarily among northern hardwoods - maple, yellow birch and beech. The cause could not be determined in 1966, and the area was not ground checked in 1967.

MISCELLANEOUS OBSERVATIONS FROM AIR AND GROUND OBSERVATIONS

Jack pine tip moth, probably Rhyacionia sonis Miller:

Abundance of dead and mined jack pine shoots were observed at the airport plantations at Bemidji, Minnesota. The damage appeared severe, with most of the upper crown shoots damaged. New buds were being formed below the killed shoot, however, this appeared to result in excessive forking and branching. Similar damage was seen throughout the Chippewa National Forest, although much less intense.

Red pine candle borer, cause not determined:

Many older a
Many older red pines were observed from Brainerd and north with dead shoots. These shoots apparently were killed before needle expansion, when 1-3 inches long. The type of damage was indicative of Lepidopterous larval activity, but the larvae were not seen. Ocassional trees were damaged severely with more than half of the shoots dead.

Oak defoliation was noticed on the Washburn Ranger District, Chequamegon National Forest. The damage appeared as that caused by a chewing insect, however abundance of leaf-feeders was not found in late August. The defoliation was noticeable in several small areas, with 25-75% of foliage removed.

Aspen foliage thinning was observed throughout Northeast Wisconsin and Upper Michigan. The thinning appeared to be the result of reduced leaf size, and apparent marginal

"burning". A disease is suspected, but the organism was not determined.

DISCUSSION

In general, the aerial survey was conducted satisfactorily. All the major insect outbreaks visible from the air at this time were observed and recorded. The following comments are made toward the improvement of future surveys.

1. The flight survey crew may be reduced to two, when both are experienced aerial observers and a pilot is available who can navigate along predetermined flight lines. Under these conditions, the crew chief should be positioned in the front-right, and the other observer in left-rear seat.
2. The aerial survey job should be subdivided for at least three survey groups. The ground examinations are most effective while the memory of the aerial observations are still fresh. Also, this would permit more time for ground checking. The minimum time allotted for ground examinations shouldbe one week per each National Forest (approx. 1 million acres). Thus future surveys might be set up as follows:
    1. Hiawatha and Huron-Manistee National Forests
    2. Chequamegon, Nicolet and Ottawa National Forests
    3. Chippewa and Superior National Forests

    Other Federal lands would be added to the nearest Forest areas.
3. The faster twin-engine aircraft performed well for the job intended. I believe, that the overall costs of the job are less than flying low-cost single engine

remted separately on each Forest.

The Forest Service aircraft was used for crew travel as well as conducting the survey. The twin-engine aircraft also provides greater safety, and permits flying during less stable air without causing undue hardships on the crew. However, individual trees or many small damage pockets are difficult to map because of the greater air speed.

4. The participation of NFA TM staff is advisable in the future. They can provide immediate identification of abnormalities seen from the air, such as herbiciding, timber stand improvement work, small fires, etc.
5. The late summer aerial survey is satisfactory for the jack pine budworm, however, the forest tent caterpillar and the spruce budworm defoliations were difficult to see. These would be easier and more accurate to observe in June.